

XIII.—Appeared off the coast of Oregon on the 27th. On the morning of the 29th it was central in southwestern Utah. On the morning of the 30th in Texas, and at midnight of the 31st in northern Kansas; at this report rain was falling in the upper Mississippi and Missouri valleys, with cloudy and threatening weather in the lake region.

NORTH ATLANTIC STORMS DURING MARCH, 1884.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0—10.

Chart ii. exhibits the paths of the principal atmospheric depressions that have appeared over the north Atlantic ocean during March, 1884. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to April 22, 1884.

The observations used are in general simultaneous, being taken each day at 7 a. m. Washington, or 12h. 8m. p. m. Greenwich, mean time.

Of the nine depressions charted, seven are apparently continuations of storms which passed into the Atlantic from the North American continent; two depressions, numbers iii. and ix., developed over the ocean, the former appearing on the 7th, between W. 40° and 45°, and the latter off the southwest of Ireland at the close of the month. The depressions have moved in a northeasterly direction, four of them reaching the British coast north of the fifty-fifth parallel. From the 1st to the 25th, fresh to strong southwesterly to northwesterly gales with rain or snow prevailed over the north Atlantic; toward the close of the month the weather moderated. Much fog was reported near the Banks. During the first and second decades of the month the atmospheric pressure remained generally low over the region north of 45° north latitude and especially so in the vicinity of the western coast of the British Isles.

The following are brief descriptions of the depressions charted:

I.—This was probably a continuation of an important depression which occupied the Gulf of Saint Lawrence at the close of February, (low area xiv., chart i. for February.) When last observed, on February 29th, the pressure at the centre of disturbance was 28.4 (721.3); moving rapidly north-eastward it passed over Newfoundland on March 1st, and by the 2d, the region of least pressure was near N. 55°, W. 30°, the lowest reported barometer reading 29.43 (747.5.) Strong westerly gales occurred over the region between N. 45° and 50°, during the 2d, with fresh to strong southerly breezes to the eastward of W. 30°. The s. s. "Clintonia," in about N. 48°, W. 40°, on the 1st, had a heavy ssw. gale, increasing to a hurricane and moderating at midnight to a heavy nw. gale. On the 3d, the disturbance was off the northwest coast of Ireland; the winds between W. 20° and 10° and south of N. 50° having changed to the westward.

II.—Was a continuation of the disturbance charted as low area i., chart i., of this REVIEW. During the 2d it moved northeastward along the coast of the United States, and on the 3d it was central east of Nova Scotia, the pressure at the centre being below 29.0 (736.6). The disturbance moved slowly eastward, and during the afternoon of the 4th the high southerly winds, which had prevailed over the region between W. 55° and 45°, shifted to westerly and blew with the force of a strong gale. Captain Moodie, commanding the s. s. "State of Georgia," in about N. 41° 47', W. 55° 21', reported; "at 0 h. 30 m. p. m., Greenwich time, after a short calm the wind came from w. by s. with hurricane force, and continued with unabating force for one and a half hours, after which it veered to nw. and nnw. and began to moderate, lowest barometer (aneroid) 29.26 (743.2). It was almost impossible to do anything about the decks, and so black was the atmosphere that nothing could be seen beyond half a mile from the ship." Captain Stokes, commanding the s. s. "Belgenland," in N. 39° 49', W. 55° 26', reported a very heavy gale on the 4th, with hail and rain squalls and lightning, wind veering gradually from w. to nw. The steamers "Weser," H. Bruns commanding, in

N. 42° 07', W. 53° 42', and "Venetian," W. H. Trant commanding, in N. 41° 56', W. 48° 22', reported, on the 4th, first, moderate southerly winds, with heavy rain and lightning, then shifting during the afternoon to strong westerly gales, with high sea. During the day the disturbance continued its north-easterly movement, and on the 5th it was apparently central near N. 51°, W. 32°. Captain Cochrane, commanding the s. s. "The Queen," in about N. 46° 26', W. 39° 58', on the 4th, reported: "at 10 a. m., of the 4th wind backed to southward and increased to a fresh gale; at 10 p. m., blowing a furious gale, with fierce squalls, thunder and lightning and very heavy rain, barometer 29.28 (743.7); the wind then shifted to nw. and settled into a strong gale, which continued until midnight of the 5th; the barometer began to rise rapidly at noon of the 5th." On the 6th the storm-centre was near the fifty-fifth parallel and between W. 20° and 15°, the pressure having increased to 29.8 (756.9). This depression was followed by a rapid increase of pressure, which caused steep gradients over the region south of N. 50° and west of W. 25°, where heavy westerly and northwesterly gales prevailed. During the 7th the disturbance passed northeastward over the British Isles.

III.—On the 6th the atmospheric pressure over the ocean, between N. 40° and 50°, and W. 40° and 50°, ranged from 30.4 (772.1) to 30.6 (777.2); during the day a rapid decrease of pressure appears to have occurred, since, by the 7th, the barometric readings over the above-mentioned region ranged from 29.8 (756.9) to 30.2 (767.1), and the winds, which had backed to sw., blew with the force of a heavy gale. Captain De Jousse, commanding the s. s. "Saint Laurent," in about N. 46° 40', W. 39° 55', on the 7th reported: "at 2.28 a. m. the barometer, which read 30.16 (766.1), began to fall rapidly, and four hours later it read 29.82 (757.4); the wind shifted from nw. to sw., and from 6.30 a. m. to 11.30 a. m. it blew with hurricane force; at 3 p. m. it shifted to nw. and decreased, the barometer rising rapidly." The ship "Armenia," E. L. Carter commanding, in N. 44° 35', W. 44° 30', had barometer 29.81 (757.1), (a fall of .42 inch since the observation of the 6th) wind w., force 7, overcast. Captain Jäger, commanding the s. s. "Nürnberg," in N. 45° 35', W. 40° 28', reported barometer 29.89 (759.2), being a decrease of about .25 inch, wind sw., force 8, hail-squalls, and very heavy sea. By the morning of the 8th the storm-centre was near W. 20°, and to the north of the fifty-fifth parallel, the lowest pressure reported being 29.6 (751.8). Strong westerly to northwesterly gales, with rain, snow and sleet, prevailed near N. 50°, and between W. 30° and 15°; east of W. 15° the winds were southerly. By the 9th the disturbance was near the British coasts, attended by moderate gales and decreasing pressure. From the 9th to the 17th the pressure remained low near the western coasts of the British Isles, causing southerly winds and rainy weather over those islands.

IV.—This was a continuation of low area iii., of chart i. It passed into the Atlantic from the coast of Virginia during the 9th, and moved northeastward to Nova Scotia on the 10th, and by the 11th it was central on the Banks of Newfoundland. At the same time a large and deep depression occupied the ocean north of N. 50°, and east of W. 35°, and the two depressions, apparently combining, formed an extensive area of low pressures which extended from the Banks eastward to the British coasts; to the westward of W. 55°, a steep barometric gradient existed, so that moderate to heavy northwesterly gales prevailed in that region. The following reports indicate the presence of this depression:

Captain Le Gallais, commanding the s. s. "Grecian," between N. 44° 27', W. 44° 12', and N. 46° 11', W. 39° 40', reported: "11th, barometer falling slowly and westerly wind increasing until 5 a. m. of the 12th, when the barometer read 28.88 (733.5), wind shifted to nw., blowing a hurricane with very high sea; at 7 a. m. the barometer began to rise, but the gale did not moderate until 4 a. m. of the 13th, when the wind hauled to n."

Captain P. d'Hauterive commanding the s. s. "France," re-

ported: during the 11th and 12th (N. 44° 40', W. 36° 40', to N. 46° 36', W. 29° 44'), threatening weather, variable winds from sw. to w., and very high sea; heavy rain during the night; at noon of the 12th the wind and sea increased, barometer falling. From the 12th to the 15th, the region of least pressure was between W. 30° and 25°, and near the fiftieth parallel; the storm-centre apparently moved slowly eastward, then southward, and finally resumed its northeasterly movement on the 15th. This period was characterized by a succession of strong variable gales, with fierce hail and rain-squalls, and pressure ranging from 28.6 (726.4) to 29.1 (739.1).

Captain Malet, commanding the s. s. "Marengo," reported: "on the 12th, in about N. 44° 50', W. 29° 58', 1 a. m., barometer (aneroid) 29.19 (741.4); 1.30 a. m., sudden shift of wind to westward, heavy rain; barometer 29.22 (742.2); 2 a. m., wind sw. by s., force 6; light rain, high, confused sea; 6 a. m., brisk w. gale, violent squalls, with hail, barometer 29.07 (738.4), falling; 3 p. m., barometer 28.9 (734.0), falling, very high sea, from w. and wsw.; 6 p. m., wind decreasing, weather squally, with rain and hail; 13th, 3 a. m., barometer 28.83 (732.3), wind wsw.; noon, moderate wsw. gale, barometer rising."

Captain Barends, commanding the s. s. "Silesia," reported: "in N. 46° 31', W. 35° 29', on the 12th, the wind increased to a hurricane from nw. to nnw., with violent snow and hail squalls in quick succession; foam and sea blown completely over the ship, the sea carrying away several articles from the deck. The gale lasted twenty hours, barometer ranging from 28.7 (729.0) to 29.4 (746.7)."

Captain Urquhart, commanding the s. s. "Lord Clive," reported "13th, in N. 48° 50', W. 27° 30', barometer 28.4 (721.3), and did not rise above 29.0 (736.6) until the 14th and then only for about eight hours; at 4 p. m. it was 28.7 (729.0) again; on the 15th, in N. 45° 27', W. 37° 10', the wind hauled to n. and the barometer rose above 29.0 (736.6)."

The s. s. "Virginian," M. Fitt commanding, in N. 46° 41', W. 35° 30', encountered a heavy nnw. gale with squalls of hurricane force and high confused sea, lasting from noon of the 12th until 9 p. m.

Captain Bence, commanding the s. s. "Baltic," reported: "14th, in N. 47° 26', W. 33° 16', 4 p. m., Greenwich time, barometer (aneroid) 28.77 (730.7), with a strong gale from wnw., varying to wsw. and high w. sea; ran into light baffling winds, and the temperature rose from 52° to 60°, with heavy leaden clouds rising in the nne. quarter; 4.30 p. m. wind shifted to n., increasing to a strong gale with terrific rain squalls and very high confused sea; weather remained threatening throughout the day, accompanied by heavy rain squalls" (ship's position on the 15th, N. 47° 55', W. 28° 37').

The s. s. "Helvetia," J. W. Rogers, commanding, in N. 46° 45', W. 29° 0', on the 14th, had barometer 28.8 (731.5); wind s. by w., force 5, cloudy.

Captain Gleadell, commanding the s. s. "Celtic," reported: "15th, in N. 48° 34', W. 27° 44', noon, barometer 28.97 (735.3), falling, strong nw. breeze and threatening appearance; 2 p. m., whole gale hauling to nnw., high, confused sea; 4 p. m., barometer 28.93 (734.8), stationary; gale at its height, afterwards gradually moderating, with rising barometer. During the 16th and 17th the disturbance remained at some distance west of the British coasts, but appeared to be losing its energy and filling up.

V.—This was a continuation of a depression charted as low area vi on chart i. It passed off the Carolina coast on the 14th and moved northeastward, causing gales of hurricane force during that and the following day, as reported by the s. s. "Valencia," S. Hess commanding, and the brig "Teneriffe," N. S. Tracy commanding. On the 15th the storm-centre was off the coast of Nova Scotia; during the 16th and 17th it moved northeastward attended by moderate to strong southwest to northwest gales in its southern semi-circle, and by the 18th the depression occupied the ocean to the northwest of the British Isles. On the 17th in N. 47° 52', W. 31° 56', Captain Norvell, commanding the s. s. "British Crown," reported barometer

29.29 (744.0), wind wsw, force 8, high sea, misty. On the 19th Captain Spicer, commanding the ship "Stephen D. Horton," in N. 51° 01', W. 15° 30', reported: "11 a. m. wind sw. fresh gale, suddenly shifting to nw. and blowing with terrific force for two hours." On the same date the s. s. "Circassian," Lieutenant W. H. Smith, R. N. R., commanding, reported: "at 4.30 p. m., Greenwich mean time, in N. 53° 55', W. 14° 50', sudden shift of wind from ssw. to w. and blew for about two hours with force 10."

VI.—This was a continuation of a depression which passed over the maritime provinces on the 17th, and is traced on chart i. as low area viii. On the 18th the centre was over the entrance to the Gulf of Saint Lawrence; during the 19th and 20th it moved northeastward, passing beyond the range of observation on the last mentioned date. The passage of the disturbance is indicated by the report of Captain Park, commanding the s. s. "Scandinavian." During the 19th and 20th that vessel was between N. 44° 38', W. 43° 53' and N. 47° 5', W. 38° 10', and reported: "a. m. of 19th clear weather but murky appearance of stars; 8.20 a. m., clouds moving from wsw., wind se., increasing to a strong gale, barometer falling steadily; 1.30 p. m., heavy rain with thunder and lightning, wind veering to sw. by w., barometer 29.73 (755.1); 3 p. m., barometer, 29.76 (755.9) moderate wind, overcast; midnight, barometer, 29.58 (751.3) wind sw., force 7; 20th, 3 a. m., squally, with rain; from 4 p. m. to 6 p. m., barometer 29.47 (748.5), squally; the barometer then began to rise and the weather improved."

VII. This depression, prior to the 20th, is traced as low area vii. on chart i. At midnight of that date the centre was southeast of Nova Scotia with strong southerly winds to the eastward; on the 21st the region of least pressure was shown near N. 45°, W. 50°, where the barometer read 29.5 (749.3). During the day the depression passed northeastward. Captain Pfeiffer, commanding the s. s. "Habsburg," reported: "21st, 11 a. m. in N. 44° 25', W. 42° 48', barometer 29.99 (761.7), wind ssw., force 4, heavy looking sky in sw. and very high n. swell, wind increasing to whole gale; 4 p. m., barometer 29.53 (750.0), wind ssw., force 9, heavy rain; 7 p. m., wind sw., increasing to force 10, very heavy and dangerous sea, lowest barometer 29.22 (741.9); 10 p. m., wind decreasing and barometer rising, 29.30 (744.2); from 10 p. m. to 3 a. m. of 22d, wind w., varying from force 8 to 10; at 3 a. m., it shifted to nw., force 10, barometer 29.55 (750.6); at 7 a. m., of the 22d, barometer 29.82 (757.4), wind n. force 6, decreasing wind and sea, weather clearing."

Captain Cochrane, commanding the s. s. "The Queen," reported as follows: "21st, 8 a. m., barometer, 30.06 (763.5), increasing sw. wind; noon, in N. 42° 57', W. 40° 50', wind freshening rapidly from sw., with confused sea, barometer steadily falling; 4 p. m., fresh gale and squally; 8 p. m., strong sw. by w. gale, with fierce squalls and very heavy, confused, and dangerous sea from s. sw. and w; midnight, no abatement in the gale, barometer still steadily falling. 22d begins with strong gale and fierce squalls; 6 a. m., during a squall, with heavy rain, the wind shifted to w., barometer immediately rising, lowest reading 29.3 (744.2); position at noon, N. 45° 29', W. 34° 41', wind wnw., strong gale, squally, weather clearing and barometer rising."

The s. s. "State of Georgia," G. Moodie, commanding, in N. 48° 0', W. 35° 12', on the 22d, reported barometer 29.19 (741.4), wind sw. force 9. By the 23d, the disturbance had passed beyond N. 55° and was apparently to the westward of the twentieth meridian.

VIII.—This was probably a continuation of low area xi. of chart i. It passed over the maritime provinces on the 29th, and on the 30th and 31st it was in the vicinity of the Banks. This depression did not develop any great storm-energy up to the close of the month.

IX.—This was a deep depression which appeared off the southwestern coast of Ireland at the close of the month, the reports indicating a barometric pressure of 29.1 (739.1) near the centre.

OCEAN ICE.

Chart ii. also exhibits the southern and eastern limits of icebergs observed in the north Atlantic ocean during the month of March and up to April 12th. This chart is based on reports communicated by shipmasters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published in the "New York Maritime Register."

During the period from March 8th, to April 12th, the southern limits of the ice region extended to N. 41° 20', while its eastern limits reached W. 40°. The reports show that icebergs were most numerous from N. 42° 30', W. 52° northeastward to N. 44°, W. 43°. During the last decade of the period (April 2-12th) there was a marked diminution in the number of icebergs observed; several steamers arriving at American ports reported that no ice was observed south of N. 42°.

Compared with the chart for the preceding month (February-March) there has been a southerly movement of about 40', but the most decided extension has been eastward, where the limit of the ice region is 3° east of that for the preceding month.

A comparison with the chart for the same period in 1883 shows that the icebergs have drifted much farther to the eastward during the present year, the eastern limit of ice region being about 4° east of that for 1883. The southern limit remained nearly the same in both years.

Icebergs were reported as follows:

8th.—Ship "Wilhelm," in N. 41° 20', W. 54° 06', saw numerous icebergs; s. s. "Saint Laurent," in N. 44° 28', W. 46° 07', passed about four miles south of an iceberg about half a mile long and fifty feet high, also sighted two enormous icebergs to the northward, also at 11.30 p. m. passed an iceberg in N. 43° 53', W. 48° 25'.

9th.—S. S. "Saint Laurent," in N. 43° 30', W. 50° 33', passed a small iceberg; bark "Orpheus," in N. 42° 51', W. 47° 10', passed seven small icebergs ranging from eighty to one hundred and fifty feet high. Ship "Anna," in 44° 11', W. 43° 55', passed a large iceberg about one hundred and twenty feet high.

10th.—S. S. "Donau," between N. 43° 51', W. 44° 51' and 42° 52', W. 48° 49', passed several icebergs; s. s. "Grecian," in 42° 18', W. 49°, passed a large iceberg; also passed two icebergs in N. 42° 30', W. 48° 20'. Bark "Montreal," in N. 43°, W. 50°, passed several icebergs.

11th.—S. S. "France" (Fr.), in N. 43° 07', W. 42° 04', passed an iceberg about sixty-five feet high and nearly a mile long; bark "Orpheus," in N. 42° 50', W. 51° 12', saw several icebergs.

13th.—S. S. "Circassian," in N. 41° 6', W. 49° 25', passed a large iceberg; temperature of the water changing suddenly from 51° to 32°; also, in N. 42° 22', W. 46° 15', passed a large iceberg, temperature of water, 60°. Ship "Anna," in N. 42° 29', W. 48° 46', passed a small iceberg.

15th.—S. S. "Bolivia," in N. 43° 26', W. 42° 49', passed a small iceberg; U. S. steamer "Thetis," in N. 46° 45', W. 47° 31', passed through seventy-five miles of ice; s. s. "Illinois," in N. 42° 58', W. 43° 05', passed a large iceberg fifty or sixty feet high; s. s. "Silesia," between N. 44° 3', W. 45° 30', and N. 43° 32', W. 47° 14', passed several large icebergs; s. s. "Thingvalla," in N. 45° 58', W. 41° 27', passed a large iceberg; s. s. "Canada" (Fr.) passed several icebergs between N. 45° 51', W. 42° 08', and N. 43° 46', W. 46° 43'.

16th.—S. S. "Iowa," in N. 45° 00', W. 41° 30', passed a large iceberg; s. s. "Lord Clive," in N. 44° 00', W. 43° 00', passed a large iceberg.

17th.—S. S. "State of Nebraska," from N. 42° 43', W. 47° 25' to N. 42° 37', W. 49° 35', passed several icebergs and some small pieces of ice; s. s. "Thingvalla," passed several icebergs between N. 43° 40', W. 47° 30' and N. 42° 46', W. 52° 46'; s. s. "Iowa," passed three icebergs in N. 43° 50', W. 44° 44'.

18th.—S. S. "Lord Clive" crossed W. 50° in N. 41° 25' and saw no ice; s. s. "Rhaetia," in N. 42° 23', W. 51° 50', passed

an iceberg about one hundred feet high; s. s. "Iowa," in N. 42° 10', W. 49° 42', saw several icebergs; ship "Columbus," in N. 44° 50', W. 45° 20', passed an ice-field and about twenty large and small icebergs.

19th.—Ship "Columbus," in N. 44°, W. 46°, passed a large iceberg.

22d.—S. S. "Moravia," in N. 43° 34', W. 45° 48', passed an iceberg; s. s. "Amerique," in N. 44° 20', W. 44° 33', passed an iceberg; ship "Columbus," in N. 42° 00', W. 49° 40', passed a large iceberg; s. s. "Habsburg," in N. 43° 38', W. 44° 39', passed three small icebergs.

23d.—S. S. "Lydian Monarch," in N. 43° 35', W. 44° 40', passed an iceberg; s. s. "Sorrento," in N. 41° 45', W. 52° 30', passed a small iceberg; s. s. "Cephalonia," in N. 45° 16', W. 42° 34', passed two icebergs; s. s. "Werra," between N. 43° 57', W. 42° 00', and N. 43° 47' W. 42° 34', passed several icebergs; s. s. "Saint Laurent," in N. 42° 10', W. 50° 25', passed an iceberg.

24th.—S. S. "Lydian Monarch," in N. 41° 48', W. 52° 55', passed an iceberg; ship "Columbus," in N. 41° 30', W. 53° 47', passed a large iceberg.

25th.—S. S. "Eider," in N. 44° 09', W. 40° 27', passed an iceberg bearing nnw., distant fifteen miles; s. s. "Wieland," in N. 44° 12', W. 44° 58', passed an iceberg four hundred feet long and one hundred feet high.

26th.—S. S. "Eider," in N. 42° 57', W. 49° 58', passed several small pieces of ice; also in N. 42° 55', W. 50° 32', an iceberg bearing n., about fifteen miles distant; bark "Erinna," in N. 43° 20', W. 48° 50', passed a large iceberg.

27th.—S. S. "Salerno," in about N. 42° 36', W. 43° 39', passed a very large iceberg together with several small bergs. The large berg appeared to be about a mile long and one mile broad, and the appearance of an island; very dangerous to navigation, especially in thick, hazy weather.

28th.—S. S. "Ontario," in N. 45° 00', W. 40° 15', passed an iceberg.

29th.—Ship "E. W. Stetson," in N. 42° 05', W. 53° 20', passed one large and two small icebergs.

April 2d.—S. S. "Tower Hill," at New York, reported having passed large numbers of icebergs between N. 44° 50', W. 47° 26', and N. 43° 23' W. 51°; s. s. "Somerset," in N. 45° 24', W. 43° 34', passed a large iceberg.

April 11th.—S. S. "Labrador," in N. 43° 11', W. 52° 23', passed a large iceberg.

April 13th.—S. S. "Bristol," at New York, crossed W. 50° in latitude 42°, and saw no ice; s. s. "Llandaff City," at New York, reported: "saw no ice south of N. 42°."

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature of the United States and Canada for March, 1884, is exhibited on chart iii. by the dotted isothermal lines.

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations:

Stations reporting highest.	Stations reporting lowest.
Key West, Florida..... 74.7	Pike's Peak, Colorado..... 4.9
Rio Grande City, Texas..... 72.2	Saint Vincent, Minnesota..... 10.7
Brownsville, Texas..... 69.6	Mount Washington, New Hampshire..... 12.2
Sanford, Florida..... 68.4	Moorhead, Minnesota..... 14.7
Jacksonville, Florida..... 66.3	Fort Buford, Dakota..... 19.6
Indianola, Texas..... 65.7	Bismarck, Dakota..... 19.7
Galveston, Texas..... 64.8	Escanaba, Michigan..... 21.1
New Orleans, Louisiana..... 64.8	Duluth, Minnesota..... 22.1
Pensacola, Florida..... 63.1	Marquette, Michigan..... 22.7
Mobile, Alabama..... 62.2	Mackinaw City, Michigan..... 23.0
Savannah, Georgia..... 61.7	Huron, Dakota..... 25.7

In the following table are shown the normal temperatures for March, the mean temperatures for March, 1884, and the departure from the normal, in the several geographical districts, as deduced from the records of the Signal Service: